

REMARKS

In order to expedite the prosecution of the present application, the subject matter of Claim 7 has been incorporated into Claim 1. Accordingly, Claim 7 has been canceled. No new matter has been added.

Claims 1-4 and 6-11 have been rejected under 35 USC 103(a) as being unpatentable over Bayenes et al in view of Ginosar et al. Applicants respectfully traverse this ground of rejection and urge reconsideration in light of the following comments.

The presently claimed invention is directed to a method for the manufacture of an ester by transesterification which comprises the steps of bringing a starting material ester and an alcohol into contact with a catalyst comprising an amorphous zirconium oxide having a crystallization temperature of at least 450°C and at least one oxide selected from the group consisting of aluminum oxide, phosphorus oxide and titanium oxide.

As discussed previously, the instant invention has been designed to overcome the problems associated with prior art transesterification reactions by providing a transesterification reaction which can be conducted in a short period of time and under a pressure on the order of a normal pressure. The catalyst used in the reaction and the product produced by the reaction can be easily separated from each other which enables the product ester to be produced in a higher efficiency. In the present invention, the utilization of a catalyst containing an amorphous zirconium oxide having a crystallization temperature of at least 450°C and at least one oxide selected from the group consisting of aluminum oxide, phosphorus oxide and titanium oxide allow very high conversion rates in the transesterification reaction. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Bayenes et al reference discloses a process for transesterifying carboxylic acid esters which utilizes a catalyst which comprises at least one silicate of group IV B elements as an active component, with titanium and zirconium being disclosed as preferred and titanium being especially preferred. There are no specific examples in this reference of using a zirconium silicate catalyst and there certainly is no disclosure with respect to the difference in catalytic activity in a transesterification reaction between amorphous zirconium oxide and crystalline zirconium oxide. This reference also has no disclosure with respect to the effect of aluminum oxide, phosphorus oxide or titanium oxide in inhibiting the crystal growth of zirconium oxide and the effects of these oxides in transesterification reactions. As will be discussed further below, the advantages associated with the present invention are obtained by using zirconium oxide in an amorphous state in combination with at least one oxide selected from the group consisting of aluminum oxide, phosphorus oxide and titanium oxide. The secondary reference cited by the Examiner must provide the motivation to one of ordinary skill in the art to modify the primary reference in a manner that would yield the presently claimed invention. It is respectfully submitted that the secondary reference contains no such disclosure.

The Ginosar et al reference discloses a process for producing alkyl esters which can be used in biofuels and lubricants. This process comprises transesterifying glyceride- or esterifying free acid-containing substances in a critical phase medium. This reference further discloses that the transesterification reaction generally proceeds in the presence of a catalyst, either acidic or basic and microporous crystalline solids, such as zeolites, and non-crystalline inorganic oxides such as alumina, silica, silica-alumina, boria, oxide sulphosforus, titanium dioxide, zirconium dioxide, chromia, zinc oxide, magnesia, calcium oxide, iron oxides, are modified, or modified with chlorine, fluorine,

sulfur or an acid or base, as well as mixtures thereof are disclosed as being suitable. The Examiner has cited this reference as teaching transesterification reactions using non-crystalline inorganic oxides, such as alumina, oxides of phosphorus, titanium oxide, zirconium dioxide, etc. and then posits that it would have been obvious to combine the teachings of Bayenes et al and Ginosar et al in order to provide a better catalyst system for transesterification reactions. However, Applicants respectfully disagree with this position of the Examiner.

Although Ginosar et al does disclose conducting transesterification reactions using an acidic or basic catalyst, this reference has no disclosure with respect to the catalyst containing at least one oxide selected from the group consisting of aluminum oxide, phosphorus oxide and titanium oxide to inhibit the crystal growth of the zirconium oxide so that the zirconium oxide has a crystalline temperature of at least 450°C. This results in a high conversion rate in the transesterification reaction as compared with catalysts which only contain zirconium oxide. That is, there is no specific disclosure in Ginosar et al of utilizing a catalyst made up of an amorphous zirconium oxide having a crystalline temperature of at least 450°C and at least one oxide selected from the group consisting of aluminum oxide, phosphorus oxide and titanium oxide or recognition of the importance of the aluminum oxide, phosphorus oxide or titanium oxide in suppressing the crystal growth of the zirconium oxide and thereby improving the catalytic properties of the catalyst. Ginosar also has no disclosure with respect to any difference between the utilization of amorphous zirconium oxide over crystalline zirconium oxide in the transesterification reaction. As such, Applicants respectfully submit that the presently claimed invention clearly is patentable over the references cited by the Examiner.

The test examples in the present specification present objective evidence which is more than sufficient to rebut any

proper showing of prima facie obviousness under 35 USC 103(a). In Tables 1-3 of the present specification, catalyst compositions falling within the scope of the present claims are tested against an amorphous zirconium oxide catalyst in transesterification reactions. As can be seen by the results contained in Tables 1-3, the catalyst compositions according to the present invention had a higher conversion rate than the amorphous zirconium oxide catalyst. This is clearly unexpected in light of the prior art cited by the Examiner and establishes the patentability of the presently claimed invention thereover.

Reconsideration of the present application and the passing of it to issue is respectfully solicited.

Respectfully submitted,


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